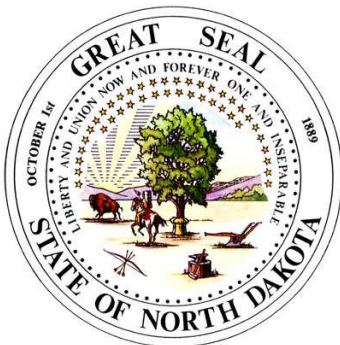# STATE OF NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION
PLANNING AND PROGRAMMING DIVISION

STIP PROCESS SYSTEM
POST IMPLEMENTATION REPORT

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                       IT Division

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Executive Summary

Project Identification

Project Name: Priority System Project   Date: 07/20/2007

Project Sponsor: Doug Faiman, DOT IT Director   Project Manager: Todd Metzger

Background

This project was a rewrite of the Priority System, which will integrate the Planning Development Program (PDPG) and Statewide Transportation Improvement Program (STIP) processes into one system.

NDDOT bids over 250 construction projects per year at an annual cost ranging from $250 to $325 million dollars. At any one time, 3 years of projects are in some stage of development. The Priority System is a process where construction projects are identified, prioritized, scheduled, and allocated a budget based on the current investment strategy.

State, County, and City officials compile a list of road improvement projects and prioritize them accordingly. They send their prioritized lists to the DOT central office, which in turn compiles and ranks the list on a state wide level. Once that process is complete the data is keyed into the PDPG (spreadsheet based) application, which then produces the STIP (Statewide Transportation Improvement Program) report from another system. The public is notified of the intended projects and comments are taken into consideration. The final STIP report is used to apply for federal money to fund these improvement projects.

The current Priority System application is an antiquated system residing on the Mainframe and built in Natural using a DB2 database. The current systems do not allow users to economically and effectively produce the desired reports or results. They spend most of their time copying data to spreadsheets in order to manipulate the data, set priorities, etc. This makes the entire process ineffective and less productive for the department.

In order to coordinate and prioritize projects, plus maximize the associated funding, we need an effective organized system to support state and federal projects. A rewrite of the Priority system integrating the PDPG and STIP functions will not only streamline the entire process, but make the department more efficient and productive by saving time and allowing staff to concentrate on the task of providing a transportation system that safely moves people and goods.

Summary

The method of project management used in this project is based on the Project Management Institute's Project Management Body of Knowledge (PMBOK) and the North Dakota Project Management Guidebook. Both methodologies are based on initiating, planning, executing, controlling, and closing processes to ensure that the project completes its objectives on time and on budget, while meeting the quality

expectations of the stakeholders.

The product, or result, of this project is a fully functional STIP Process system, which conforms to office standards. The applications were developed in Websphere with an Oracle database by the Information Technology Department (ITD). The project streamlined the process that use to be three separate systems, the Priority System (mainframe), Planning Development Program (PDPG), and the STIP report system into one system. This system will be used by the Executive Office, Planning, Bridge, the Districts, Local Government (Cities, Counties, Transportation Enhancements, and Safe Routes to School), Federal Highway, Cities, and Counties.

In summary, some additional benefits to the system are a user-friendly web based application with flexible segment definitions. The goals of the project were to implement any Federal mandated changes, increase staff efficiency, provide the users with more information, and to provide the users with additional functionality.

Survey
I released a Post-Project Survey to gain an awareness of the satisfaction of the product and the process used in the project. Only four surveys and one e-mail comment were returned, and even those were not complete. Therefore I was unable to provide any reliable statistics. I made sure to include all the comments from those who did submit a survey.

One comment made was that the survey was too long. In an effort to encourage more participation we developed a web survey to make input easier for the stakeholders. I received one additional e-mail comment, but no surveys. In the future I will continue to use the web-based survey as it will take less effort on the stakeholders' part, which should encourage more participation.

The surveys that were returned indicated the stakeholders were satisfied with how the project and product performed. The system functionality, ease of use, reduction in manual processes, and other benefits meet or exceeded expectations. Some comments from the survey said:

"I am pleased with the results of the project. The people working on this project were responsive to me. The conducted themselves in a gentlemanly manner. I found that it is easy to enter project information…."

"…I have heard several comments about how nice the new program is. Thank you for all of your hard work."

"…Todd and thanks for running such a fine project with good results."

A. Product Effectiveness

Project Objectives

1. Implement Federal Changes
2. Increase Staff Efficiency
3. Improved Access to Information
4. Provide Added Functionality

Objectives Reviewed

Federal changes were implemented such as new programs defined in SAFETEA-LU, such as Safe Routes To School, Small Rural Economic Development, and ND Streets were added to the system.

Staff efficiency was increased by removing manual functions for reports and spreadsheets, which were incorporated into the system. A report was created displaying the status of the scoping report, which is stored in a separate location. The current investment strategy was incorporated into the system. The integration of the three separate systems streamlined the entire process and made the staff more effective and efficient while performing their duties

Access to the system was improved for all authorized district and central office personnel. We now have the capability for FHWA, counties, cities, and MPO's to access the system, which was unavailable to them in the past. The integration of the three separate systems provides one location for users to access all information needed to perform their duties. Information is easily accesses through a user friendly web based system. All the pertinent RIMS data is available in the system.

Added functionality is now provided to all authorized customers. They are able to see an overall view of the STIP report as it progresses through it phases. GIS functionality is utilized in the system to produce maps for executive meetings and the STIP report. The Highway Performance Classification System is integrated into the system through the investment strategy. The functionality exists to categorize the projects by type of work and\or funding. The Bridge division is now able to input their priorities similar to a district. The system now incorporates the National Bridge Inventory (NBI) definitions for the bridge segments.

B. CSSQ Management

During the course of the project we used an integrated change control process to control cost, scope, schedule, and quality. The change control process worked extremely well in keeping the stakeholders to the original scope, particularly with the amount of turn over in key stakeholders. Overall we had sixteen items run through the change control process. Two of the major items were items 1 and 11 (described below).

Cost

We recorded and tracked the cost of the project using a single MS Excel workbook. I tracked plan values, earned values, actual cots, the cost variance, and the cost index for each phase of the project and the overall project. I also record the values for each reporting period to give a range of the projects performance. The cost index ranged from 1.000 to 2.012 during the course of the project, with a final overall value of 1.074.

There were two impacts to the cost of the project. The first was for additional scope with an estimated cost of $25,000 (described in the Scope section), and another for an additional resource at a cost of $10,000. Item 11 dealt with an impact of change, issued by ITD, to addresses the increase in project cost due to a contractor programmer. The contract programmer's total charge to the project was $27,622 (317.5hours x $87\hour). The difference between an ITD resource, $58\hour, and the contract programmer is $29. The impact is for the difference in cost of the resouce: 318 hours x $29 = $9,222. As a result, we added $10,000 to the development phase of the project.

The original scope of the project was completed at a cost of $250,307, which is $5,218 (2%) under the original budget. The additional scope to the project added an estimated $25,000 to the budget, and was completed at roughly 350 hours, or $20,300 (18.8%) under estimate. A project resource was added at a cost of $10,000. The project was then re-baselined at $290,525. The final project cost of $270,607, which included the additional scope and resource, is $19,918 (6.9%) under the revised budget.

Scope

The scope was recorded and tracked within the project plan. All deliverables were met in a timely manner. Overall we had sixteen items run through the change control process. One of the major items run through change control that affected scope was item 1.

Item 1 dealt with the additional functionality to the system (Scope Creep). Scope was added and the budget was re-baselined to include the $25,000 impact in development and testing. The schedule was not affected as ITD is going to put more resources on the project (schedule crashing).

Schedule

We developed, recorded, and tracked the schedule using MS Project, a high level schedule in a table within the project plan, and a MS Excel workbook. I tracked the schedule variance and the schedule index for each phase of the project and the overall project. I also record the values for each reporting period to give a range of the projects performance. The schedule index ranged from 1.000 to 1.500 during the course of the project, with a final overall value of 1.042.

The product was implemented nearly four weeks ahead of schedule and all other deliverables were either on time or ahead of schedule. Due to time constraints with the Planning & Programming Division caused by the large amount of turn-over in staff, informal training has been provided for the Central Office as they need to use the system

without delay. I will provide a more formal training session once the draft STIP has been produced, and provide the customer manual at that time. I will then train the District Engineer's closer to the time they will need to use the system, September\October time frame, so it will be fresh in their minds when they need to use it. This will be done post project.

Quality

Quality Assurance is proactive. It consists of activities designed to assure that quality *will be* built into the product. These activities either precede the building of the product, or happen concurrently with it. In order to accomplish this we held several analyses and brainstorming meetings to ensure the proper requirements were defined for the system.

Quality Control is evaluative. It consists of activities that are designed to determine if quality *was* built into the product, and if not, where the deficiencies reside so they can be corrected. These activities are done *after* the product has been built. In order to determine quality we did extensive testing through a test plan. The test scripts ensured that the product was built to specifications. Each customer singed off on their realm of system.

C. Risk Management

Ten risks were initially identified for this project. Of those, four occurred during the course of the project. They are:

- Workload: The Project Managers workload maybe taxing to the point of causing delays in the project. To alleviate this risk the plan was to communicate the workload to supervisors. Meet with supervisors and express concerns and shift work to other areas, workload leveling. This was good in theory, but with the current workload of our section\division it was difficult to commit a suitable amount of time to the project.

- Scope Change: Changes can take several forms, including the functions to be addressed, the number of organization units to be involved, the level of detail of products, the specific products to be provided, the allocation of resources, etc. Each change has the potential to put timely project completion at risk, or to cause rework or to examine task/product incompatibilities. To remedy this I implemented a strict change control processes and ensured it was adhered to at all times. In addition, I made sure there was a sufficient contingency fund to draw from. If the contingency fund is expended then an impact to the project will be needed and either additional funding acquired or proceed without the additional functionality. Utilizing the change control process worked extremely well. It kept the major stakeholders, which were constantly changing, from making drastic changes.

- Missed Requirements: It is crucial that all questions are asked and all information required for the configuration of the system be addressed during the requirement phase. If items or design items are missed or misunderstood, the project timelines could slip or rework may be required. The course of action was to ensure full

stakeholder involvement. Use the change control process to determine acceptable changes to the specification criteria, and ensure there is a sufficient contingency fund and project float time to draw from. This risk is somewhat tied to the Scope change risk and was difficult to manage with so many of the major stakeholders constantly changing during throughout the project. However, the change control process worked to perfection.

- Resources: In the event that the vendor, ITD, needs to add staff in addition to that already planned, that staff would likely be contract staff selected from the vendor pool. Those developers would likely exceed the $58 per hour rate that was estimated. The plan was to monitor staffing needs closely and make adjustments proactively. Use the change control process to determine the effects on cost, scope, schedule, and quality (CSSQ). Notify the project sponsor. These actions succeed to a point. The project sponsor decided to accept the additional resource, which resulted in an impact to the project.

D. Communications Management

Communication is one of the most important parts of any project. An effective communications plan can be the key to success. Stakeholders were brought in at the appropriate times and team members were updated on a regular basis.

All communications and documents were kept electronically in the Project folder on the O drive, (O:\81 Special Projects\PrioritySystemRe-Write), which the project team had access to. Information on the network drive was work in progress documents as well as completed documents. Following the conclusion of the project, all relative documentation was archived in FileNet as the final project repository.

Weekly meetings were held with the core team members.

Biweekly status reports were produced and disseminated.

This project was being used for a NITAS certification. Meetings were held on a biweekly basis with my mentor as well.

Executive Steering Committee (ESC) meetings were held quarterly to review the quarterly large project oversight report and any questions were answered.

Quarterly meetings were also held with the Large Project Oversight representative.

For the most part the plan worked well. Again, there were some communication issues with the movement of key stakeholders coming and going on the project, but this was over come by getting them involved as early as possible.

E. Acceptance Management

The project had a beneficial acceptance management plan that captured the approval of all deliverables. The more notable sign-offs being the analyses, testing, and project acceptance.

F. Organizational Change Management

Stakeholders saw a change in how they access the system, an increase in the available information from the system, and the efficiencies the system afforded them. The impact of the system ranged from central office staff, district staff across the state, cities and counties, to the public. All of the potential customers of the product were involved at some point during the project, which made the transition a bit smoother.

To ensure an efficient transition from project to operations, training will be developed and conducted by the training team. An initial session will be given to provide all users with the knowledge to operate the system efficiently and effectively. When new users are introduced to the system, i.e. new employee, they will receive the user manual and given a brief training session from the Planning & Programming Division.

Due to time constraints with the Planning & Programming Division caused by the large amount of turn-over in staff and the project manager's workload, informal training has been provided for the Central Office as they need to use the system without delay. A more formal training session will be provided once the draft STIP has been produced, at which time the customer manual will be distributed. District Engineer's will be trained closer to the time they will need to use the system, September\October time frame, so it will be fresh in their minds when they need to use it. This is being done post project.

On going costs listed in the Budget section will be placed in the appropriate base budget for the IT-Engineering section.

G. Issues Management

An integrated change control process was put in place to deal with any issues that arose. All issues were recorded in an issue log. These issues were given a priority, which determined where the issue fell with regard to other pending issues, and assigned to the appropriate individual. If the issue can not be resolved at the project manager\team level it will be escalated to the project sponsor, then ultimately the executive board if needed. Overall issue management worked very well. Issues were addressed in a timely and effective manner.

Over the course of the project six issues were raised. The chart below lists some of the major issue:

Issue #	Date Raised	Issue Title\Description	Actions Taken
1	8/31/2006	Additional scope was added to the project (see change request number 1). The added functionality was estimated to be $25,000.	The change request was processed through change control and additional funding was added to cover the added scope.
2	10/13/2006	From ITD's Status Report: There are many difficult programs that are taking a while to code. Also, a contractor has started helping with the coding. There may be an impact towards the ending of the development if we are running short.

This resource is being billed at a rate of $85\hour compared to an ITD resource of $58\hour. Eddie didn't ask for the additional resource and isn't sure how long the contractor will be on the project; he's assuming through January (end of development). Vern, Denny, and Doran placed the contractor on the project to give them something to do. ITD currently has 8 contractors in the shop because of the abundance of work and no qualified applicants from the ITD job openings that they have posted. | Notified the sponsor and core team.

Doug (project sponsor) contacted Vern and he assured him that at this point even using this person, they plan to complete this project on time and on budget. |
| 3 | 11/22/2006 | A request was sent over by Diane Gunsch for Planning to add highway direction to ADT and ESALS tables and to change all of the DB2 natural programs to allow for this. Eddie copied portions of 10 of these natural programs into java and now he has to go back in the java code and also add direction and retest everything again. | As this is a result of a different request (WO32433, SR1076439) to have the direction added to the ADT and ESALS tables. That request will pickup the charges for the changes it will generate to this project. All work will be charged to EMO10017, Diane's project, which she has agreed too. This project will still need to account for the time (60 hours) needed to update the code and tables (re-work). |

Issue #	Date Raised	Issue Title\Description	Actions Taken
5	2/6/2007	With all the turn over in the Planning & Programming Division it had raised an issue with having testers who are qualified Subject Matter Experts (SME). This will place a heavier burden on the project team members that are still on the project. To date the project has lost DOT stakeholders Grant Levi, Darcy Rosendahl, Bob Fode, and Ron Henke. Tim Horner also moved to a new position, but I am able to keep him on the project since he is now over the DOT-IT department.	I have spoken with Bob and others who were on the test team to see if they could still use them as testers.

H. Project Implementation and Transition

Please refer to the Organization Change Management section. The only issue during this phase was the delay in training.

I. Performance of Performing Organization

The DOT had some issues with staff turnover and dedicating the proper resources to the project because of this, which is understandable. Overall the DOT performed well.

The vendor, ITD, also performed well. One issue I would like to bring up, which was out of the team's control, is the addition of the contract programmer to the project. This was done without DOT's prior knowledge or approval. This was not planned for in the project and was not necessary for the project to complete on time. It affected both the project budget and schedule. In future projects we will want to approve the addition of resources and\or scope changes before they are added to a project.

J. Performance of Project Team

The DOT project teams performed admirably. Some difficulties evolved due to the turnover of key stakeholders. However, the project teams handled this exceptionally well.

The vendor's team did a very good job working with the customers to obtain the requirements for this project. Again, this project had many difficulties with respect to the amount of turnover the DOT had with major stakeholders. They were able to over come this and produce a quality product. Eddie also put in an extra effort working with the customers to convert the data and getting them comfortable with the system.

K. Key Project Metrics

Cost

Final Cost	Final Approved Baseline Cost Estimate	Difference from Final Cost	Original Cost Estimate	Difference from Final Cost
$270,607	$290,525	$19,918 Under Budget	$255,525	$15,082
		6.9% Under Budget		5.9%
Number of approved changes made to the original budget.				2
Number of "re-baselined" budget estimates performed.				2

Details of the cost are expressed in section B, CSSQ management, of this document.

Schedule

Number of milestones in baseline schedule.	7
Number of baseline milestones delivered on time (according to last baselined schedule).	7
Difference in elapsed time of original schedule and final actual schedule.	1 Month ahead of schedule
Difference in elapsed time of final baseline and final actual schedule.	1 Month ahead of schedule

Details of the cost are expressed in section B, CSSQ management, of this document.

Scope

Number of baseline deliverables.	15
Number of deliverables delivered at project completion.	14
Number of scope changes in the post-planning phases.	1

Details of the cost are expressed in section B, CSSQ management, of this document.

Quality

Number of defects/quality issues identified after delivery.	0
Number of success measures identified in the Business Case that were satisfied or achieved at project completion.	4

Details of the cost are expressed in section B, CSSQ management, of this document.

L. Lessons Learned

- Projects should start with the beginning of the biennium to avoid any schedule constraints. It was an issue with the agency and budget figures coming out of PeopleSoft. As noted in the Project Charter: There is a scheduling risk to this project. It is unclear why there was a delay in the start of this project, but it did not begin until November 2005. This will cause the project to bump up against the end of the biennium when funding will run out. It will be imperative that the vendor puts adequate resources on this project to ensure the project is completed by the end of the biennium, June 2007.
  Lesson Learned: If possible, start projects at the beginning of the biennium to avoid scheduling issues later in the project.

- ITD has implemented a new policy of providing agencies with a Budget Estimate, which is a high level estimate, and a Work Estimate after the analyses has completed. Agencies need to keep this in mind when ask the legislators for an appropriation and include a managerial reserve to cover any differences between the original request and the actual scope when the work begins. There maybe a year and a half time period between the request for the appropriation and the start of the project.
  Lesson Learned: Keep this in mind when doing budget estimates for future biennium. Include a sufficient managerial reserve to cover any scope changes in the project.

- I was informed that our project would be in violation if we did not turn in a signed copy of the project plan by the end of business day of the end of the quarter, which was June 30. I informed the sponsor and I pulled together the plan and had the sponsor and executive committee chair sign it. I turned it in and we were not in violation. However, I pointed out to the sponsor that we need to setup roles and responsibilities regarding this as there is some ambiguity as to who is tasked with this.
  Lesson Learned: Ensure all Large Project Oversight policies and procedures are review before the project starts and assign those tasks to the appropriate individuals.

- The initial project budget estimate, provided by the vendor, included a 20% risk contingency. I had erroneously assumed that funds from this contingency would be available for scope additions. However, I later learned that the risk contingency calculation was based only for risk to the existing scope and its' use was controlled by the vendor. A risk materialized adding additional scope to the project. The additional functionality to the project required more funding than what I had set aside for contingency.
  Lesson Learned: Include your own contingency (risk) reserve and managerial reserve funds in the project. Managerial reserve is funding set aside by management for changes to the scope of the project (i.e. scope additions) and must be approved for use through the change control process, and agreed to by the executive committee. Contingency reserve is funding or time set aside as an estimator's allowance for the cost of unknowns, changes to make things work, or estimating errors, and is at the discretion of the project manager.

- The vendor, in this case ITD, added a contract programmer to the project. This added resource was not needed nor was asked for by DOT or the ITD project manager\lead developer. ITD had hired eight contractors as a result of not being able to fill a number of open positions. They admittedly placed this contractor on the project to train them on their process of coding. As a result, we received an impact to the project of $9,222. The total cost to the project for the contract programmer was $27,622.
  Lesson Learned: Any change in resources (added, removed, or otherwise) needs to be approved by the agency, through the change control process, before they are, in this case added, to the project. The vendor can not just add additional resources to the project at their own whim, especially one at a higher rate.

- Even though we meet with almost everyone individually to test the system, the testers did not go through the test scripts to verify their screens. I sent the test plan out February 28th and expected them to go through it on their own and sign each one off since we had already gone through most of it with them. However, when I asked for the sign off sheets on March 20th nobody had them. At this time we were already preparing for the parallel (acceptance) test by converting all the data from the mainframe, cleaning it up and populating the code tables. It was too late for them to re-test their scripts. Eddie was doing this in the test environment instead of the production environment. We plan to move seamlessly from acceptance testing right into production. I told Eddie this should have been done in production and not test so people could still test without corrupting the production data. They did, however, sign off on the testing phase as they did test the system.
  Lesson Learned: There were two lessons learned:
  First, schedule testing times with the testers in the training room to ensue they have some dedicated time to go over the test scripts and sign them off.
  Second, make sure any parallel testing is done in the production environment to allow people to continue to test. This was solved by allowing them to finishing the data scrubbing in test then copying test over to production and only allowing Ron access to production. This also nearly completed the implementation phase of the project.

- One of the more prominent lesson learned during this project was that some of the stakeholders need to hold to the project objectives as they had to be reminded to not go outside of the project scope. In addition, not all the information needed to make an accurate analysis was provided by Planning. The team spent some time back tracking by looking at options and services that were not suitable to meet the objectives. These issues were due, in most part, to the amount of turnover Planning had during the project. There were three different directors and three different assistant directors.
  Lesson Learned: The project needs to stick with the scope that was agreed upon. This tends to make scope creep somewhat difficult to control when some of the major stakeholders change, especially multiple times, throughout the project. If scope does change ensure that it is processed through the change control process. A proper change control process was the saving grace.